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(56) Documents Cited

GB 2269253 A GB 2251503 A

(58) Field of Search

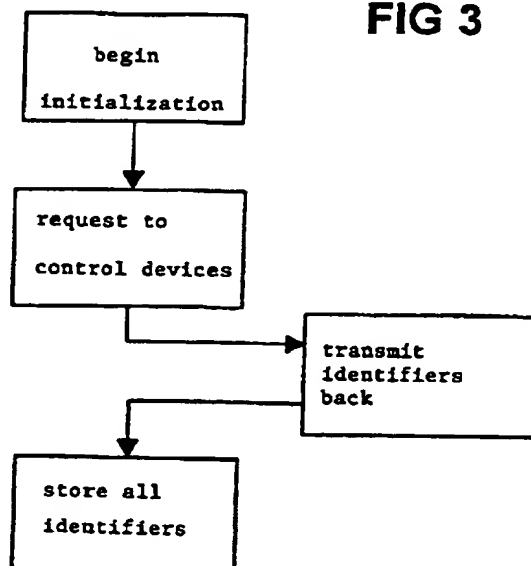
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(54) Abstract Title

Initializing motor vehicle anti-theft system

(57) Upon the initialization of an anti-theft system, after receiving a starting signal a request signal is transmitted by a central control device - by way of a data line. Those control devices which are connected to the data line transmit an identifier back, which is stored in the central control device. In this way, the extent of the control devices linked into the anti-theft system is fixed. In later authentication procedures all of these control devices must respond with their identifier before the vehicle can be used. Advantageously, an electronically coded dongle is used as one control device.

FIG 3



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FIG 1

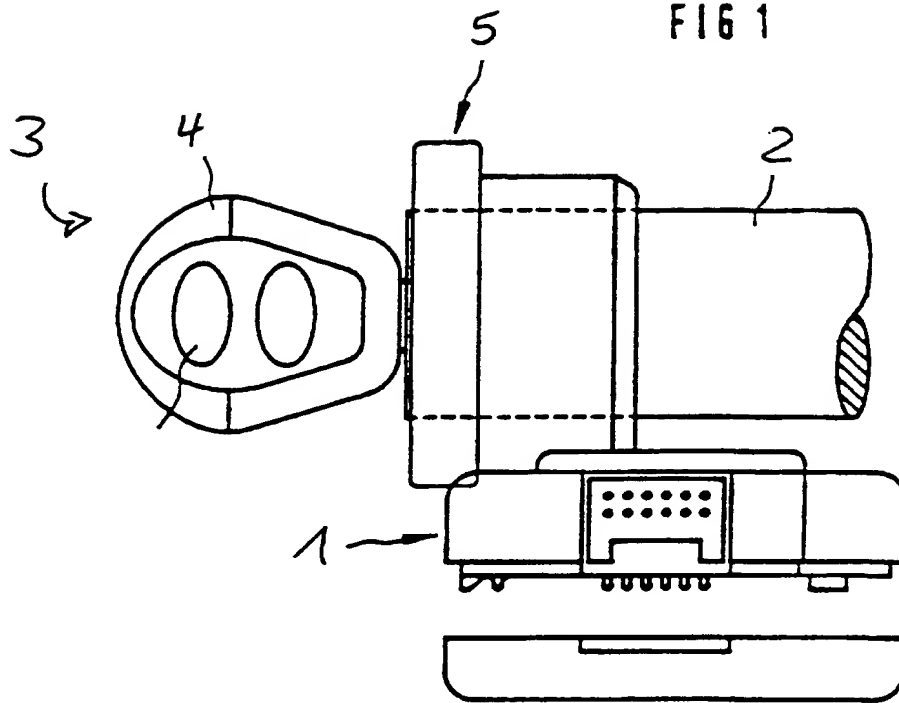


FIG 2

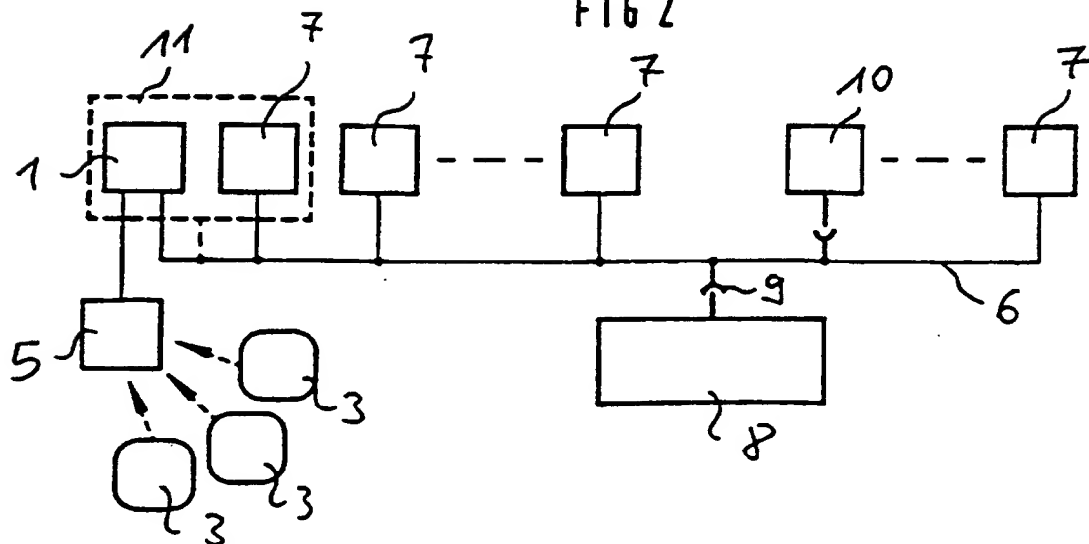
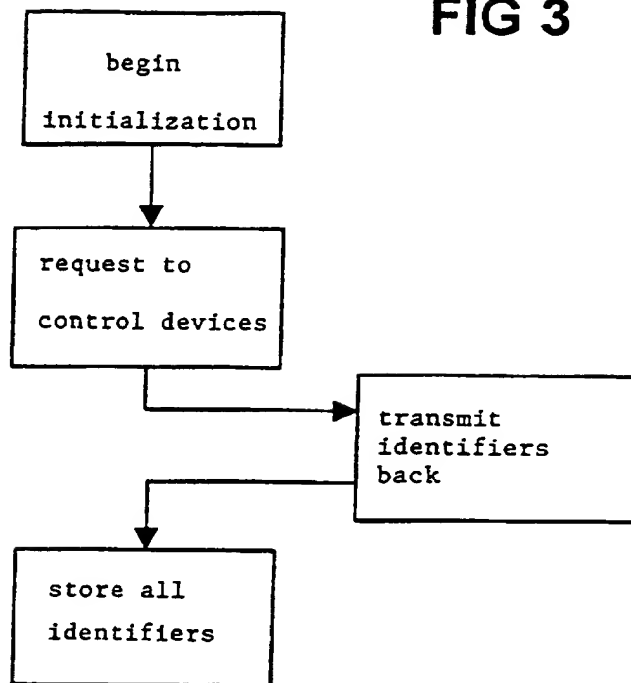


FIG 3



ANTI-THEFT SYSTEM FOR A MOTOR VEHICLE AND METHOD FOR
INITIALIZING THE ANTI-THEFT SYSTEM

The invention relates to an anti-theft system for a motor vehicle, in particular an immobilizer, where control devices are only released if a code signal is recognized as authorized.

5 An anti-theft system known from DE 43 33 474 C2 has one or more encoders which transmit their code signal to a testing unit in the motor vehicle. The testing unit is connected by way of a data line to several control devices. After receiving the code
10 signal, the testing unit prompts all control devices connected to the data line to transmit their identifier back. The identifiers are examined in the testing unit for their authorization and if a predetermined number of the control devices respond correctly, the starting
15 of the motor vehicle is enabled.

 The testing unit of such an anti-theft system must know from the start which control devices are linked into the anti-theft system. Because motor vehicles are frequently equipped differently, each testing unit with
20 the known anti-theft system must be prepared to the level of equipment according to preset software before the testing unit can carry out an authentication procedure.

 An anti-theft system for a motor vehicle and a
25 method for initializing the anti-theft system are likewise known from Patent Specification DE 195 26 530 C1. In this respect, several control devices are linked into the system, all of which must signal their identifier code word back correctly, before the vehicle
30 can be started. If a control device is replaced, the new control device must be initialized first of all. The key codes of two keys are required for this purpose. Moreover, the identifiers of control devices are scanned by a testing unit. If both keys are then

accepted by the testing unit and a release is transmitted by way of a diagnosis device to the testing unit, the new code words are stored in the replaced control device.

5 The invention seeks to create an anti-theft system which is easily assembled and which can be easily adapted to every type of vehicle.

 According to the invention there is provided a method for initializing an anti-theft system of a motor vehicle, wherein:

10 a starting signal is transmitted to a central control device, in order to start the initialization,

 a request signal is transmitted by the central control device by way of a data line,

15 the central control device receives identifier code signals from control devices connected to the data line and

 all identifier code signals or all responding control devices are stored by the central control device as belonging to the anti-theft system in order to request identifier code signals from all of these control devices in future authentication procedures and examine them for their authorization.

20 According to the invention there is provided an anti-theft system for a motor vehicle which is initialized by a method according to the invention having

25 a central control device which is connected by way of a data line to several control devices,

30 an input unit by way of which a starting signal is transmitted to the central control device in order to start the initialization,

 a portable encoder which, upon request, transmits a code signal to an aerial of the central control device, whereupon an authentication takes place between

35

the central control device and the control devices,
after the successful outcome of which the motor vehicle
can be used.

Thus, in accordance with the invention, upon
5 initialization a starting signal is transmitted to a
central control device, with the initialization being
started as a result. Thereupon, a request signal is
transmitted by the central control device by way of a
data line, so that all control devices connected to the
10 data line respond with their identifier. All received
identifiers are stored in the central control device
and are respectively examined in future authentication
procedures.

With this method, identifiers of all control
15 devices connected to a data line are advantageously
only recorded during an initialization procedure and
are permanently stored.

Advantageous developments of the invention are set
out in the subclaims. In this way, the starting signal
20 can be transmitted by a diagnosis device outside the
vehicle to the central control device. Likewise, the
starting signal can be generated by an unusual
operation of a switch in the motor vehicle.

One of the control devices can be an
25 electronically coded plug part which is releasably
connected to the data line. In this way, the user or
the vehicle manufacturer can decide themselves whether
such a plug part is to be included in the
authentication.

30 For a better understanding of the present
invention, and to show how it may be brought into
effect, reference will now be made, by way of example,
to the accompanying drawings, in which:

Figure 1 shows a partial view of an anti-theft
35 system in accordance with the invention.

Figure 2 shows a block diagram of the anti-theft

system.

Figure 3 shows a flow chart of a method for initializing the anti-theft system.

5 An anti-theft system of a motor vehicle, in particular an immobilizer, can prevent the normal use of a motor vehicle by an unauthorized user. For this purpose, the anti-theft system has a central control device 1 (Figure 1) which is arranged, for example, in a housing on the ignition lock 2 of the motor vehicle. 10 A portable encoder 3 is arranged, for example, on an ignition key 4. As soon as the ignition key 4 with the encoder 3 is inserted into the ignition lock 2 and turned, a code signal is transmitted to an aerial 5 on the ignition lock 2, which aerial relays the code 15 signal to the central control device 1.

In the central control device 1 the code signal is tested for its authorization and, with authorization, a request signal is transmitted by way of a data line 6 (Figure 2) or bus to control devices 7 which are 20 connected to the data line 6. After receiving the request signal, the connected control devices 7 transmit binary coded identifier code words (called identifiers in the following) back to the central control device 1. In the central control device 1 the 25 identifiers are compared with stored identifiers. If they correspond, a release signal is generated which isolates all control devices 7 so that the vehicle can be used (start engine and drive off). If they do not correspond, the control devices 7 remain blocked and 30 the motor vehicle cannot be used.

The procedure of this so-called authentication has already been explained by way of example in the Patent Specification DE 43 33 474 C2 (which is equivalent to US 5,675,490) cited in the introduction. The procedure 35 of the authentication will therefore not be discussed in more detail here.

The entire anti-theft system must be initialized first of all so that the central control device 1 knows all identifiers of all connected control devices 7. The procedure of the initialization will be explained in more detail with reference to the flow chart of Figure 3.

First of all a starting signal is transmitted. This starting signal can come from a diagnosis device 8 outside the vehicle, which device is available, for example, in an authorized workshop. Here the diagnosis device 8 is attached to the data line 6 by way of a diagnosis interface 9 in the vehicle. The starting signal is only transmitted to the central control device 1 upon proof of authorization. The starting signal has a specified coding, by means of which the initialization of the central control device 1 is started (cf. Figure 3).

After receiving the starting signal, the central control device 1 transmits a request signal by way of the data line 6 to all connected control devices 7 so that they transmit their identifiers back.

A coded identifier is stored in each control device 7 or is generated there with the aid of a stored, mathematical algorithm. After the request signal is received, the identifiers are transmitted back to the central control device 1. The central control device 1 then stores all identifiers as belonging to the anti-theft system. For the sake of security, the stored identifiers cannot be read from the outside either from the central control device 1 or from a control device 7.

From the identifiers the central control device 1 knows all control devices 7, which, when the anti-theft system has just been initialized, are scanned for their identifiers for the authentication procedure and are tested for their authorization.

If a thief purloins a vehicle, on the one hand he needs an authorized encoder 3 and, on the other hand, all control devices 7 which were originally present during the initialization procedure. If he does not
5 have the encoder 3 it is not sufficient for him to replace a control device 7 in order to avoid the anti-theft system. He would have to replace all the control devices 7, this being very costly and expensive. Use of the vehicle is therefore made difficult for him.

10 If a control device 7 is not initialized (because it was replaced, for example) and therefore does not belong first of all to the anti-theft system, the user can initialize the anti-theft system anew if he has the authorized encoder 3. By means of an unusual operation
15 of the ignition key 4 in the ignition lock 2 (for example by means of repeated turning to and fro) the code signal can be repeatedly transmitted in part, this then acting like a starting signal for initializing the anti-theft system.

20 Subsequently installed control devices do not have to be linked into the anti-theft system. The rightful user can therefore extend their equipment of the vehicle without this influencing the anti-theft system. Neither do they therefore have to go to an authorized
25 workshop in order to change their equipment.

Advantageously, one of the control devices 7 is constructed as an electronically coded plug part 10 (also called "dongle" in the following), which is
30 connected to the data line 6 in a pluggable and therefore releasable manner. The vehicle manufacturer can determine upon an initialization at the end of the strip whether such a dongle 10 is used in the initialization or not. If it is used, the dongle 10 must be present during future authentication procedures
35 to be able to use the vehicle. The authorized user can decide whether they use the dongle 10 or not also with

later initializations.

5 A dongle 10 has the advantage that it can be very small because it only has to contain small electronics with an electronic coding. In this way, the dongle 10 can be well hidden in the motor vehicle so that an unauthorized person does not find it. People standing outside consequently do not know whether there is a dongle 10 and where it is arranged. This increases protection against theft.

10 The central control device 1 can have its own housing - as shown in Figure 1 - or it can be arranged integrated into a control device 7, such as the motor control device. It can also be accommodated together with a control device 7 in a safety housing 11. A gear control device, an air bag control device, an ignition control device, a central switching and security control device etc. can be connected as additional control devices 7 to the data line 6.

20 Only those control devices 7 which are present during the initialization of the anti-theft system and which transmit their identifier back are also included later in an authentication procedure and must transmit their identifier back correctly so that the vehicle can be used properly. In this way, such an anti-theft system can be used universally with different vehicle types with different levels of equipment. In this way, a vehicle can have a gear control device for automatic transmission, whereas another vehicle has a gearbox without gear control device. The central control device 1 does not have to be preprogrammed to the level of equipment. The level of equipment is recognized during the initialization by the identifiers which are signalled back. All recognized control devices 7 are then also linked into the anti-theft system.

35 At least one control device 7 and the coded plug part 10 have to be linked into the anti-theft system so

that security is of a sufficiently high level. The more control devices 7 are linked, the greater the security against unauthorized use of the motor vehicle.

5 The encoder 3 can be a transponder which, after receiving a challenge signal, transmits a response signal. A transponder is a small component which can be arranged both on a handle of a key and on a card the size of a cheque card. For its part, the transponder has an aerial which receives signals or transmits
10 signals to the aerial 5 on the ignition lock 2. Advantageously, the aeriels are constructed as coils, by means of which the signals are inductively transmitted.

The encoder 3 can also have a switch or a button
15 12, upon the operation of which the code signal is transmitted wirelessly to the aerial 5 of the central control device 1.

Advantageously, the code signal and the request signal change after every transmission according to a specified, secret algorithm, so that listening to the
20 signals is pointless. The identifiers are only transmitted back by the control devices if the request signal was previously correctly received. In this way, neither can the identifiers be read without
25 authorization.

The identifiers of the different control devices 7 must differ. The identifiers are binary coded code words, the bit length of which determines the complexity of the code. In this way, the anti-theft
30 system can only be outwitted by means of systematically going through all code possibilities with great difficulty.

CLAIMS

1. Method for initializing an anti-theft system of a motor vehicle, wherein:

5 a starting signal is transmitted to a central control device, in order to start the initialization

a request signal is transmitted by the central control device by way of a data line,

10 the central control device receives identifier code signals from control devices connected to the data line and

all identifier code signals or all responding control devices are stored by the central control device as belonging to the anti-theft system in order to request identifier code signals from all of these control devices in future authentication procedures and to examine the requested identifier code signals for their authorization.

2. Method according to claim 1, wherein the starting signal is transmitted to the central control device by a diagnosis device outside the vehicle by way of a diagnosis interface.

3. A method for initialising an anti-theft system substantially as herein described, with reference to the accompanying drawings.

25 4. Anti-theft system for a motor vehicle which is initialized by a method according to one of claims 1-3, having

a central control device which is connected by way of a data line to several control devices,

30 an input unit by way of which a starting signal is transmitted to the central control device in order to start the initialization,

a portable encoder which, upon request, transmits a code signal to an aerial of the central control device, whereupon an authentication takes place between the central control device and the control devices,

after the successful outcome of which the motor vehicle can be used.

5 5. Anti-theft system according to claim 4,
wherein a control device is an electronically coded
plug part which is releasably connected to the data
line.

10 6. Anti-theft system according to claim 4 or 5,
wherein the input unit is a diagnosis device outside
the vehicle, which device transmits a starting signal
by way of a diagnosis interface to the central control
device for the introduction of the initialization.

15 7. Anti-theft system according to one of claims
4-6, wherein the input unit is an input unit inside the
vehicle, which unit generates the starting signal upon
specified operation and transmits it to the central
control device for the introduction of the
initialization.

20 8. An anti-theft system substantially as herein
described, with reference to the accompanying drawings.

9. A motor vehicle having an anti-theft system as
claimed in any preceding claim.



The
Patent
Office

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Application No: GB 9902882.1
Claims searched: 1-9

Examiner: Mike Davis
Date of search: 5 May 1999

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.Q): G4H (HTG), F1B (B2Z)

Int Cl (Ed.6): B60R

Other:

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
A	GB 2269253 A (A B ...) eg abstract	-
A	GB 2251503 A (INTELEPLEX) eg abstract	-

DOCKET NO: GTP/US 3183

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X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.